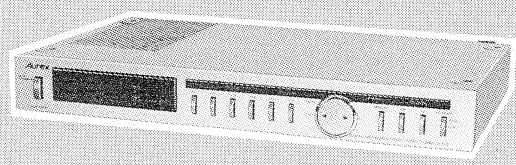
SERVICE DATA
FILE NO.170-114

TOSHIBA

DIGITAL SYNTHESIZER TUNER

ST-S70



SPECIFICATIONS

■ General Data

Power supply:	220V – 50 Hz for Europe 240V – 50 Hz for United Kingdom & Australia
Power consumption:	9W
System dimensions (mm):	420(W) x 73(H) x 286.5(D)
System weight:	3.0 kg

■ Tuner

Micro computer controlled frequency synthesizer tuning

Frequency range:	FM 87.50 – 108.00 MHz 410 channel AM 522 – 1602 kHz 120 channel
Memory:	6 channels each band (FM/AM)
Functions:	Manual scanning (FM 50 kHz step, AM 9 kHz step)

■ FM Tuner Section

Sensitivity (IHF):	1.9μV (10.8 dBf)
Harmonic distortion:	1 kHz MONO 0.15% STEREO 0.25%
S/N:	MONO 74 dB STEREO 69 dB
Frequency response:	30 – 15 kHz ±1.0 dB
Selectivity (IHF):	75 dB (±300 kHz)
Image rejection:	95 dB
IF rejection:	100 dB
Capture ratio:	1.0 dB
Spurious response:	103 dB
AM suppression:	68 dB
Stereo separation:	45 dB (at 1 kHz)

■ AM Tuner Section

Receiving frequency:	522 – 1602 kHz (9 kHz step)
Sensitivity:	200μV/m
Selectivity:	30 dB
Image rejection:	50 dB
S/N:	55 dB

Specifications are subject to change without notice.

TE , TU

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1. OPERATING CONTROLS

Front Panel Facilities

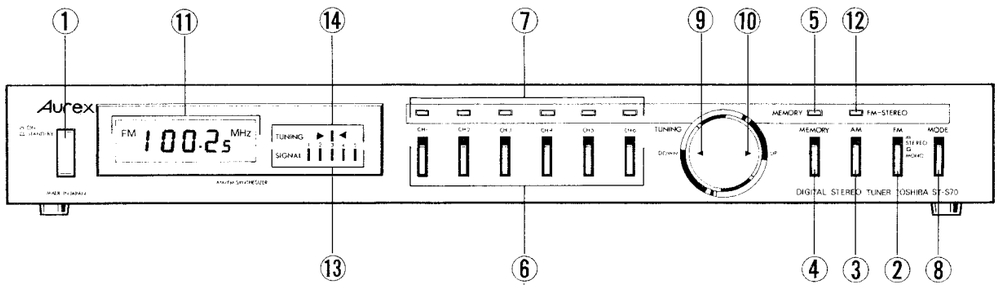


Figure 1.

(1) Function switch
Depress this switch to turn the power on, depress once more to put the equipment into the standby mode.

Radio band selector buttons
Choose the programme source by pressing one of these buttons:
(2) – for FM radio broadcasts
(3) – for AM radio broadcasts

(4) Memory button
To store the frequency of any desired station in the memory, first press this button. The memory indicator lamp (5) located directly above this button lights up, indicating that the memory is ready to accept the frequency. But note that the indicator lamp remains illuminated for about 5 seconds.

(6) Preset tuning buttons (1 – 6)
Whilst the memory indicator lamp (5) is illuminated, press one of these buttons. The frequency of the desired station is now stored in the memory. To tune in that frequency later, simply press the same tuning button.

(8) Mode (mono/stereo)
In "stereo" position, the tuner is set to receive either stereo or mono FM broadcasts. Interstation noise is reduced by a muting function incorporated with this position. To reduce noise and improve reception when tuning a very distant station, switch to "mono" setting.

■ RADIO TUNING

(9) Down
When the tuning switch is pressed "down", the tuned frequency is decreased in 50 kHz steps. This "stepping" change in frequency continues until the switch is released.

(10) Up
Likewise, when the tuning switch is pressed "up", the tuned frequency is increased in 50 kHz steps until the switch is released.

■ INDICATORS

(11) Digital frequency
The tuned frequency on either band (FM or AM) is displayed here in digital form.

(12) FM stereo indicator lamp
This lamp is illuminated when an FM stereo broadcast is being received.

(5) Memory indicator lamp
This LED lamp lights up for approximately 5 seconds when the memory button (4) is pressed, indicating that the memory will accept a frequency for presetting during that period.

(7) Preset indicator lamps
One of these LED lamps is illuminated whenever the corresponding preset tuning button (6) is pressed.

(13) Signal level
These LED lamps light up successively from left to right according to the strength of the signal being received. If fewer than four or five lamps light up when a local station is tuned, check antenna connections and direction.

(14) Fine tuning
One of a pair of triangular red LEDs shows the proper direction for further tuning (up or down) by the tuning switch. When the station is optimally tuned, the green LED between the triangular red LEDs lights up and neither red LED remained lighted.

Tuner Operation

First press the desired radio band selector button.

Tuning
Press the tuning switch down (9) or up (10), keeping it depressed as the frequency display shifts toward the desired station frequency. When close to that frequency, release the switch, then press again in single steps to tune in the station exactly.

Preset tuning
The major feature of the ST-S70 is the digital synthesizer tuner section and its capacity to memorize six separate stations on each of the two bands, for a total of 12 stations. Once a station is preset in the memory, it may be tuned instantly and accurately whenever desired by simply touching one button.

(1) First check the official broadcast frequency of the desired stations (up to six stations on each band), or simply tune in the stations as described above by tuning.
(2) After confirming that the station is accurately tuned, press the memory button (4). The memory indicator lamp (5) above it will light up for about 5 seconds, showing that the memory is ready to store the frequency.
(3) Immediately press one of the preset tuning buttons (6), while the memory indicator lamp remains lighted. If the lamp goes off before the desired preset tuning button can be pressed, simply press the memory button again.
(4) Repeat this procedure for each station to be stored in the memory.
(5) To tune in one of these preset stations later, make sure that the proper band is selected, then simply press the preset tuning button corresponding to that station.

Note 1. In West Germany and a few other countries, assigned station frequencies are specified to 50 kHz (89.95 MHz or 89950 kHz, for example), rather than the usual 100 kHz.

Note 2. To retain the contents of the memory, a small electric current flows through the unit even when the function switch is in standby position. When the unit is not in use for a long period, it should be unplugged from the mains. But note that if this power interruption is longer than one day, preset memory is lost and those stations must be reset, unless batteries are used. To prevent loss of memory contents, do not unplug the power cord or turn off the switch at the wall socket for any length of time during normal use.

Battery Installation

Open the battery cover as shown in Figure 4. Then insert two UM-3 batteries as shown in Figure 4, being careful to position them for correct (+) and (–) polarity. Replace battery cover.

■ NOTES ON BATTERY USAGE

1. Batteries will ensure that the contents of the memory are retained if the unit should be unplugged from mains power for a long interval, or if power is interrupted by a remote control unit
2. A set of batteries will remain operative for about one year if the ST-S70 is disconnected from the wall socket. If the unit is disconnected from mains power by a remote control unit, a set of batteries will last for about one year.
3. Replace worn-out batteries immediately. Be sure to use UM-3 batteries.

Cautions

(1) Since the SB-A70 integrated amplifier produces high output power, it radiates a significant amount of heat. When stacking the ST-S70 with the SB-A70, always be sure to place the ST-S70 tuner under the SB-A70 amplifier.
(2) To provide adequate means for heat radiation, do not cover the ventilation openings.

Connections

Refer to Figure 1

(1) Terminals are provided for both 300 ohm and 75 ohm FM aerials. Please be sure to connect your aerial to the proper terminals.

(2) When listening to the AM band, adjust the bar antenna to the optimum direction for good reception.

(3) Connect the output terminals of the tuner to the tuner input terminals of your amplifier, making sure that the L and R cables are not reversed.

(4) Remote control is possible by use of the external RM-70 remote control unit. Remote control operations include: ON and OFF power switching, 6-station preset tuning, AM/FM band switching and UP and DOWN tuning.

■ ANTENNA CONNECTIONS

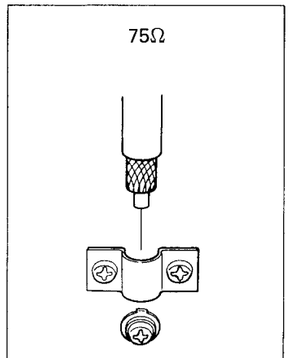


Figure 2.

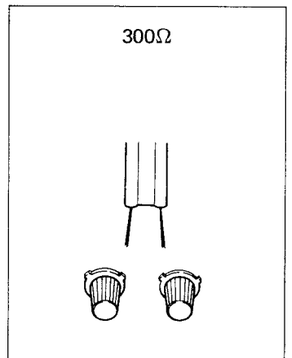


Figure 3.

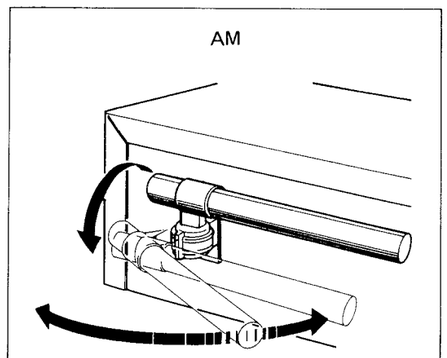


Figure 4.

■ BATTERY INSTALLATION

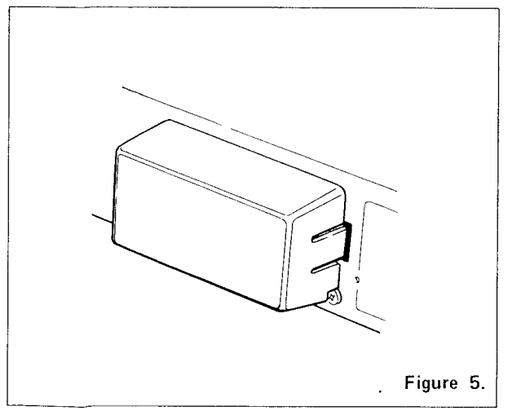


Figure 5.

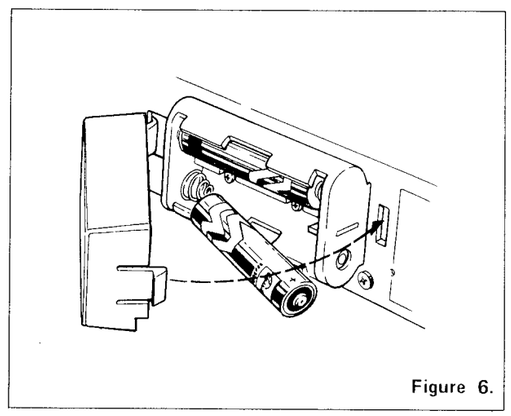


Figure 6.

System Connections

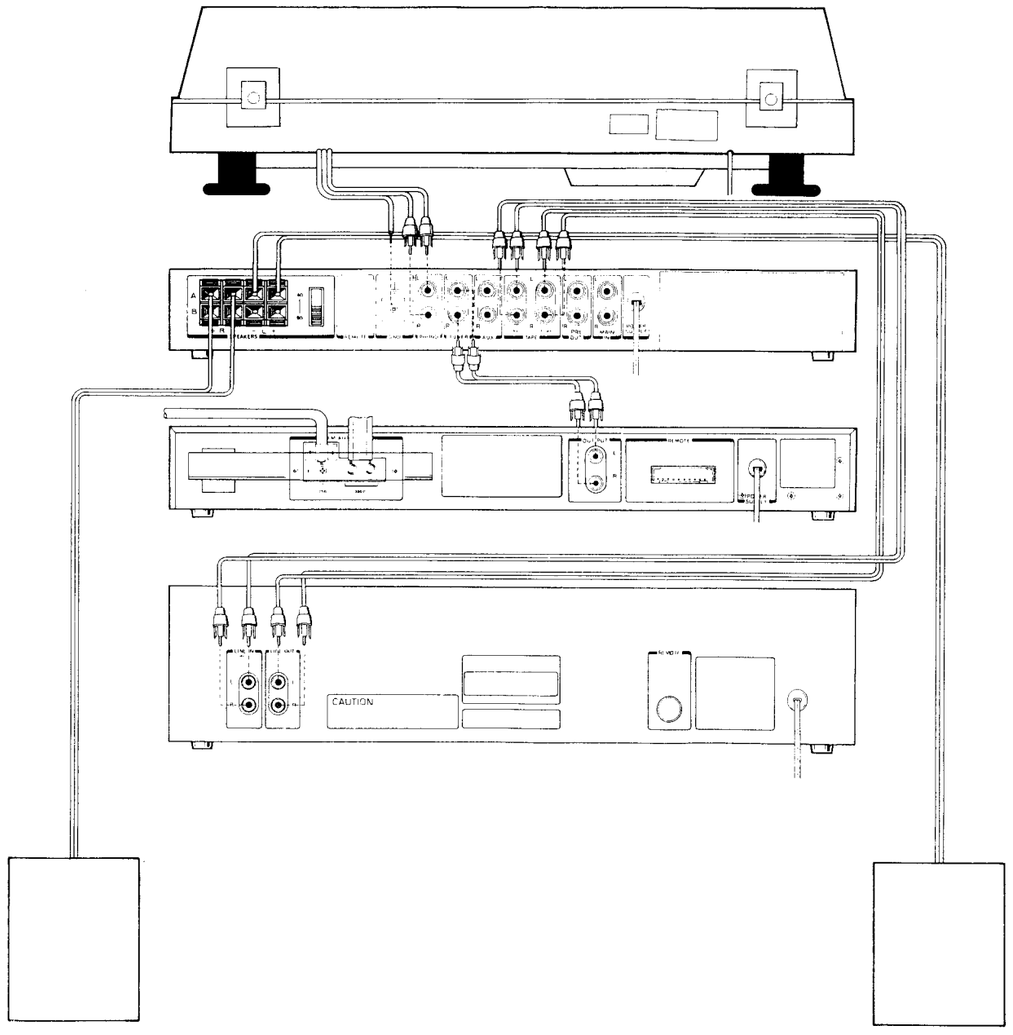


Figure 7.

2. DISASSEMBLY INSTRUCTIONS

TOP COVER REMOVAL

1. Remove 4 screws (A), (B) on the side.
2. Remove 1 screw (C) at the back to detach the top cover.

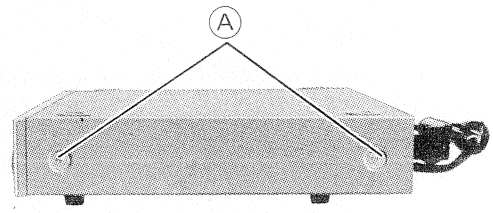


Figure 8.

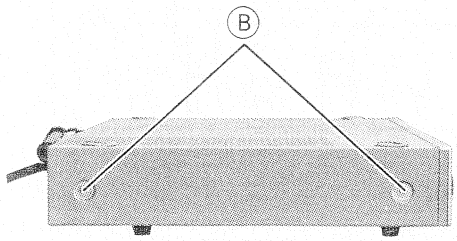


Figure 9.

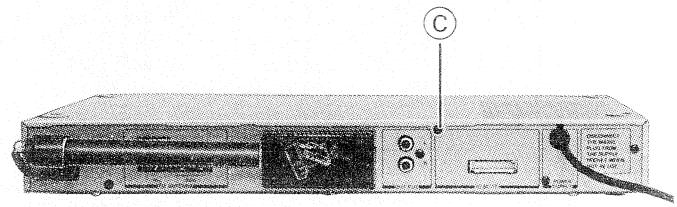


Figure 10.

BOTTOM COVER REMOVAL

1. Remove 6 screws (D) to detach the bottom cover.

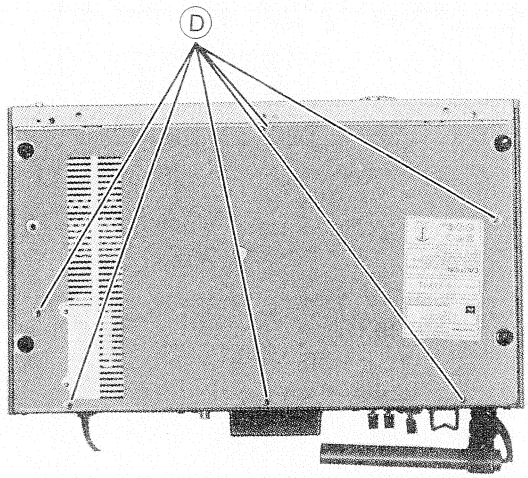


Figure 11.

FRONT PANEL REMOVAL

1. Remove 6 screws (E), (F) to detach the front panel.

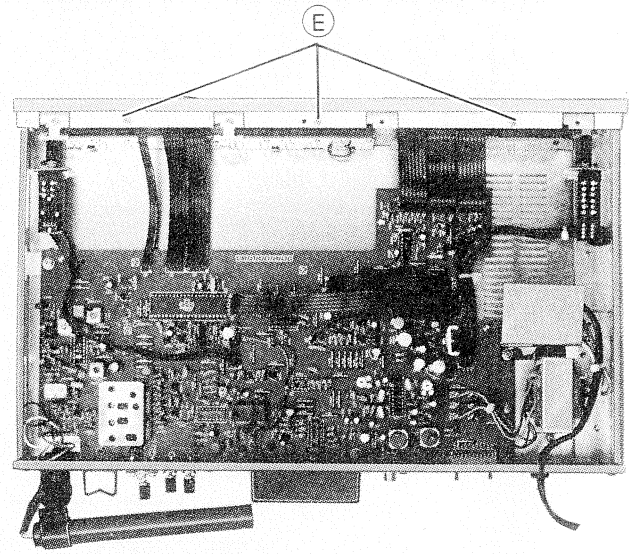


Figure 12.

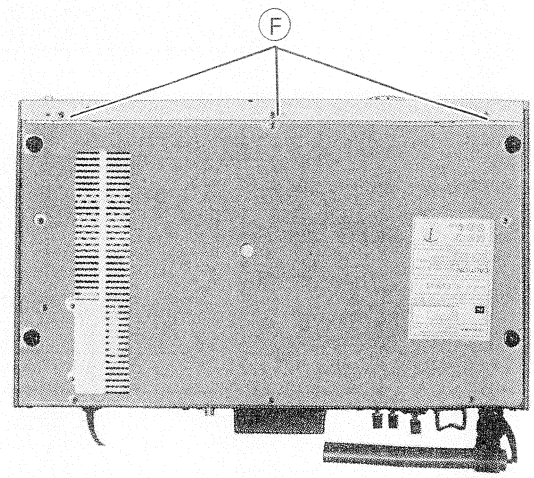


Figure 13.

3. IC'S BLOCK DIAGRAM

HA12016

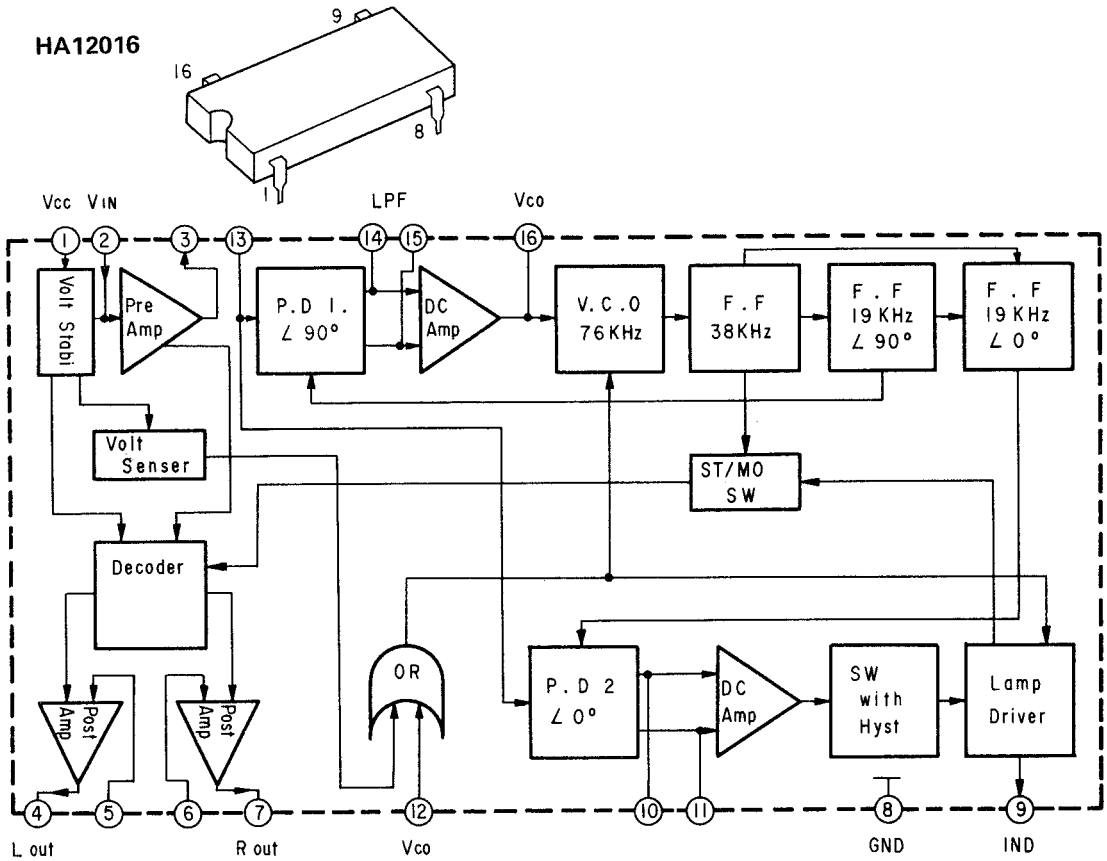


Figure 14.

LA1231

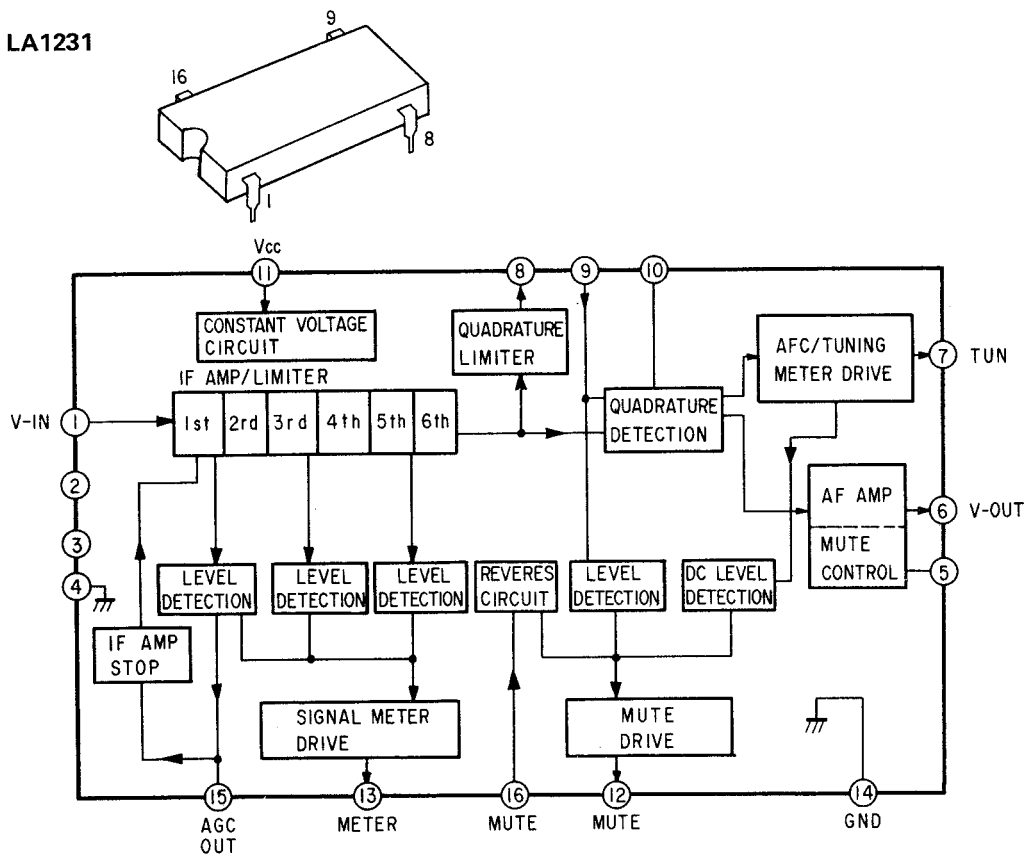
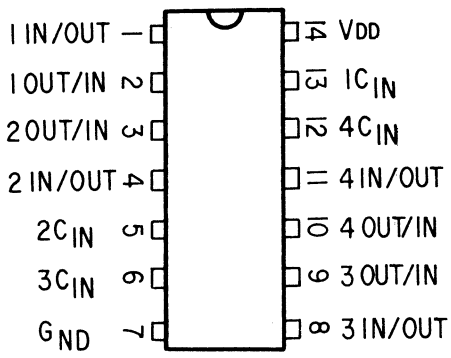


Figure 15.

TC4066P



TRUTH TABLE

C_{IN}	IN/OUT - OUT/IN
H	R_{ON} *
L	Z

* Refer to electric featnres
Z High inpedance

S CHEMATIC DIAGRAM

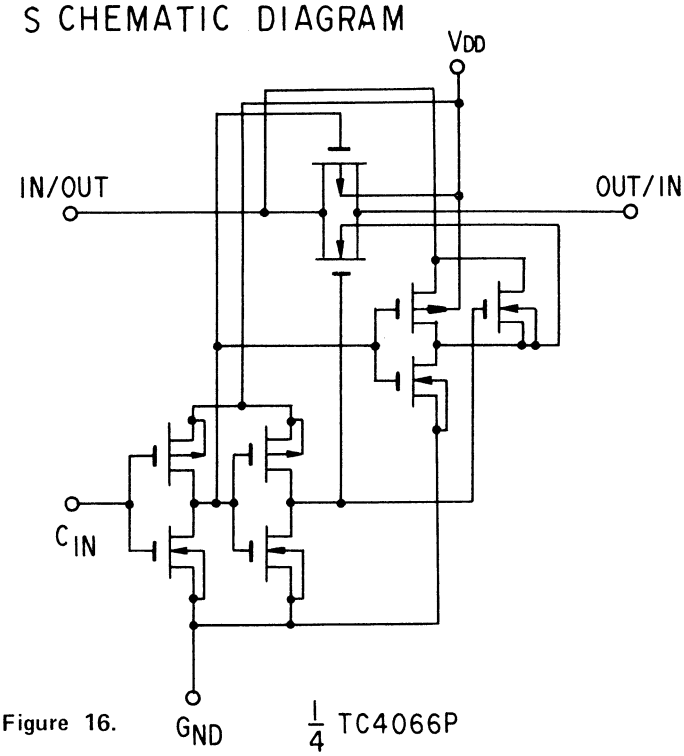
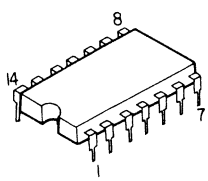


Figure 16. $\frac{1}{4}$ TC4066P

TA7654



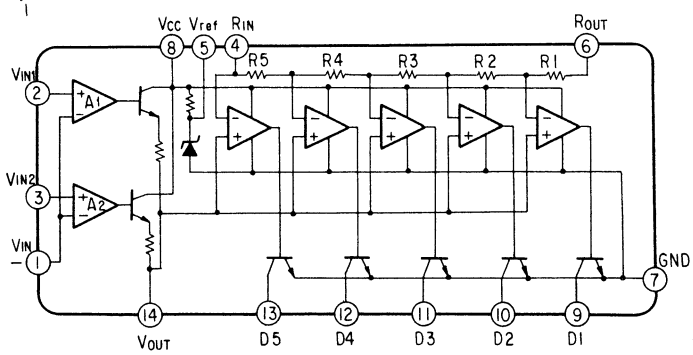
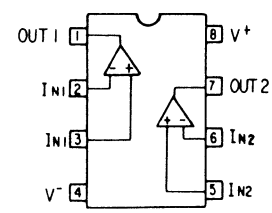


Figure 17.

NJM4558

Connection Diagram (Top View)



Equivalent Circuit (1/2 Circuit)

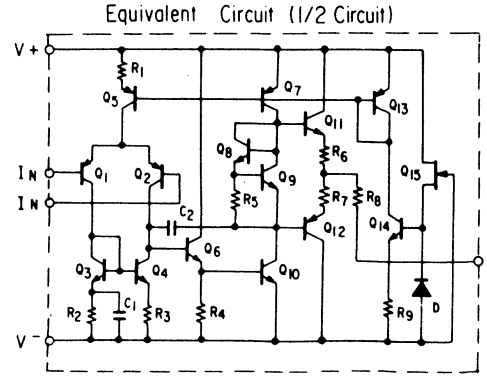
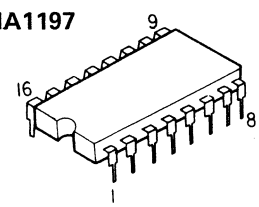


Figure 18.

HA1197



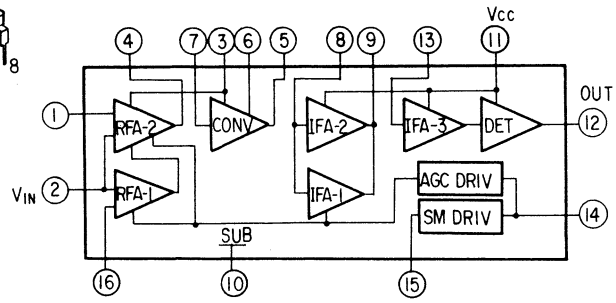
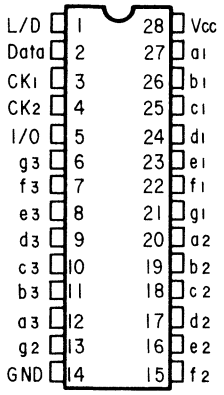


Figure 19.



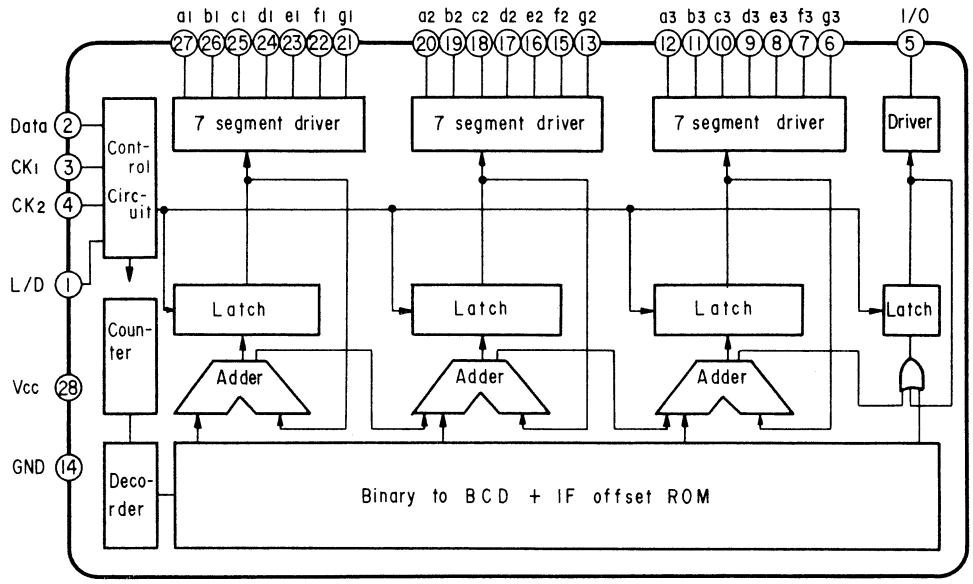
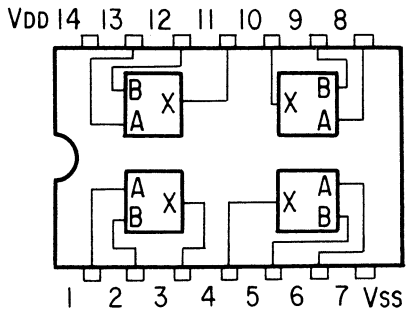


Figure 20.

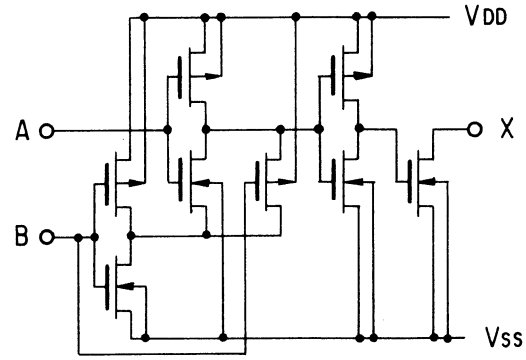
FUNCTION OF TERMINALS

Pin No.	Names	Functions
1	L/D	Output switching input terminal. Input terminal for switching output signal with indicators (LED, FL, LCD).
2	Data	Receiving frequency data input terminal inputted from system controller TC9137P serially.
3 ~ 4	CK_1, CK_2	Timing input terminal for controlling receiving frequency data input transmitted from system controller TC9137P simultaneously with data.
5	1/0	Segment drive output terminal indicates figures of 100 MHz at FM and 1000 kHz at AM.
6 ~ 12	$a_3 \sim g_3$	7 segment drive output terminal indicates figures of 10 MHz at FM and 100 kHz at AM.
13, 15 ~ 20	$a_2 \sim g_2$	7 segment drive output terminal indicates figures of 1 MHz at FM and 10 kHz at AM.
14	GND	Ground terminal.
21 ~ 27	$a_1 \sim g_1$	7 segment drive output terminal indicates figures of 100 kHz at FM and 1 kHz at AM.
28	Vcc	Power and voltage apply terminal.

TC5029BP



LOGIC DIAGRAM



1/4 TC5029BP

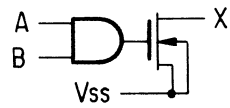
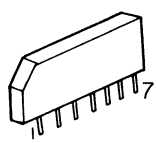


Figure 21.

TRUTH TABLE

INPUTS		OUTPUT
B	A	X
L	L	HZ
L	H	HZ
H	L	HZ
H	H	L

TD6104P



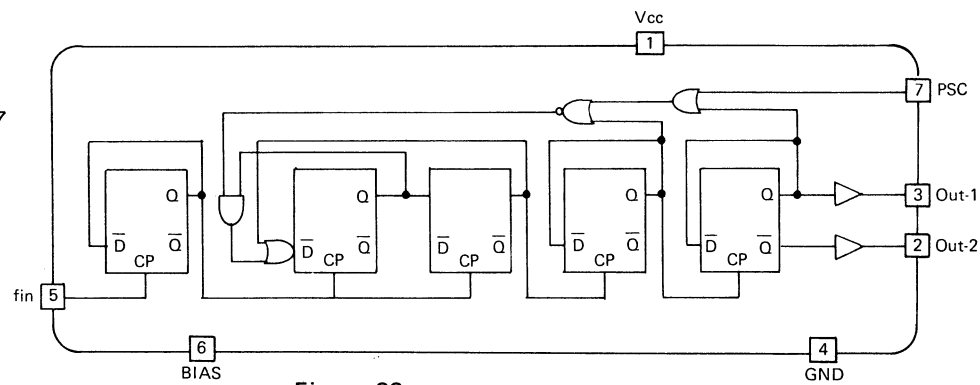


Figure 22.

FUNCTION OF TERMINALS

Pin No.	Names	Functions
1	Vcc	Power terminal Vcc = 5V ICC = TYP 5mA, Max. 10mA
2	OUT-2	Reverse signal output of OUT-1. Because of open emitter style, external resistor is needed for use. Usually open.
3	OUT-1	Frequency dividing output terminal. Output which devides input signal from fin to 1/30 or 1/32. Output level 0.5(V) MIN
4	GND	Ground terminal.
5	fin	Input terminal of FM oscillating signal. Frequency range 60 ~ 140 MHz Input level 75 ~ 300mV rms
6	C	External terminal of by-path capacitor in bias circuit. Connect capacitor (2200pF) between grounds.
7	PSC	Frequency dividing values switching control terminal. 1/32 at Vpsc 2(V) 1/30 at Vpsc 1(V)

TC9137P

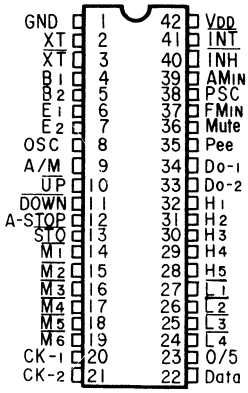
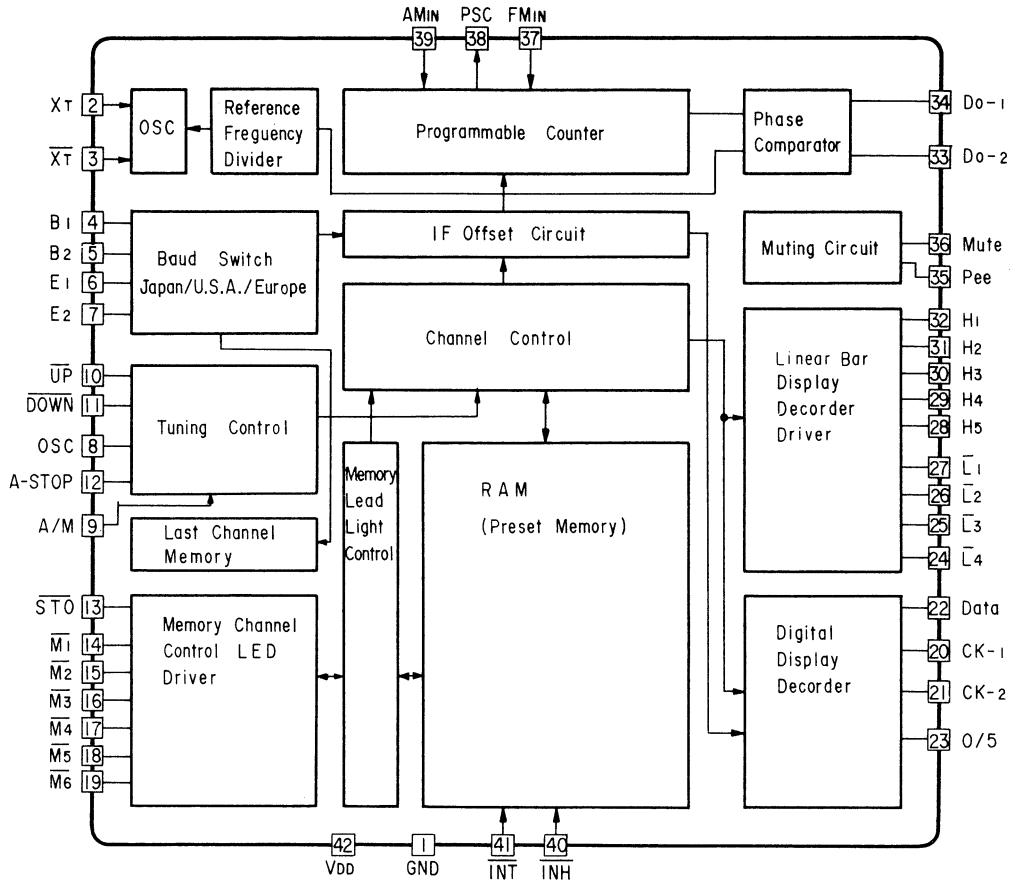


Figure 23.



FUNCTION OF TERMINALS

Pin No.	Name	Functions
1	GND	Ground terminal
2, 3	X_T $\overline{X_T}$	Crystal oscillator connecting terminal for reference frequency. X'tal 7.2 MHz Oscillation stops at INH.
4, 5	B_1 B_2	FM/AM band switching input terminal and FM/IF fine tuning selecting input terminal. B_1 B_2 0 0 AM 1 0 FM (10.7 MHz –50K) 0 1 FM (10.7 MHz +50K) 1 1 FM (10.7 MHz)
6, 7	E_1 E_2	Japan/U.S.A./Europe switching input terminal. E_1 E_2 Mode 0 0 – 1 0 Japan 0 1 U.S.A. 1 1 Europe Input of E_1 and E_2 can be read and be latched at INH=L or FM/AM band switching.
8	OSC	Terminal connecting capacitor and resistor of oscillator which determines auto serch speed. Automatic release of preset memory and shifting time to fast fowarding at band selection are determined by this oscillation frequency.
9	A/M	Terminal of input switching UP/DOWN tuning mode to manual and auto serch. "H" input ----- auto serch "L" input ----- manual

Pin No.	Name	Functions
10, 11	$\overline{UP}$ $\overline{DOWN}$	Tuning key input terminal. Manual: Pressing more than 0.3 second with 1 step/1 push mode allows fast fowarding mode. Releasing the key stops fast fowarding and station on the way is passed. Auto search: Auto search starts with push and stops automatically detecting the station. * Pull-up resistor enclosed.
12	A-STOP	Auto search stop input terminal. If "H" level is applied to this terminal during auto search, the scanning stops.
13	$\overline{STO}$	Preset memory input terminal I/O terminal housing LED driver. ● When STO key is pressed, STO lamp will light and when desired memory number key is depressed, the receiving frequency data is described on the memory and STO lamp goes off. ● If memory number key is not depressed even though STO key is depressed, memory is released automatically.
14 ~ 19	$M_1 \sim M_6$	Memory address designating input terminal. I/O terminal enclosing LED driver. ● $M_1 \sim M_6$ designate address of memory for FM during FM reception and for AM during AM reception. ● For description depress STO key and for desired station depress $M_1 \sim M_6$. ● Reading out can be mode by depressing any desired station of $M_1 \sim M_6$.
20 ~ 23	CK-1, CK-2 Data, 0/5	Terminal of output of data for digital display of receiving frequency and timing signal output. Data for static frequency display driver TD6301P and timing signal is outputted by one cycle only when frequency is renewed in such case that power is turned on, UP/DOWN key is operated, auto scanning is activated, memory is read out or FM/AM is switched. In ordinal receiving conditions, this terminal is fixed to "L" level. ○ Data Binary cord data of frequency and receiving band. ○ CK-1, CK-2 Initialize and transmitting clock. ○ 0/5 For 50 kHz display on FM in Europe.
24 ~ 27	$\overline{L_1} \sim \overline{L_4}$	Output terminal for driving LED of linear scale display of receiving frequency. $H_1 \sim H_5$ and PUSH/PULL drive LED. Max. 18 points
28 ~ 32	$H_1 \sim H_5$	Output terminal for driving LED of linear scale display of receiving frequency. $L_1 \sim L_4$ and PUSH/PULL drive LED.
33, 34	Do-1 Do-2	Output terminal of phase comparator. As the same outputs are generated in parallel at Do-1 and Do-2, this terminal can be used for FM and AM exclusively.
35	Pee	W is the generating output terminal during key operation.
36	Mute	Output terminal for muting. Usually it is in "L" level, at muting, it changes to "H" level.
37	FM IN	FM programmable counter input terminal. Built-in AMP in INPUT.
38	PSC	Control output terminal of swallow counter type prescaler TD6104P.
39	AM IN	AM programmable counter input terminal. Built-in AMP in INPUT.
40	$\overline{INH}$	Inhibit input terminal. Normal operation at "H" level and inhibit operation at "L" level.
41	INT	Initialize input terminal. Normal operation at "H" level and initialize operation at "L" level.
12	V_{DD}	Power and voltage applying terminal. 5V ± 0.5V

4. BLOCK DIAGRAM

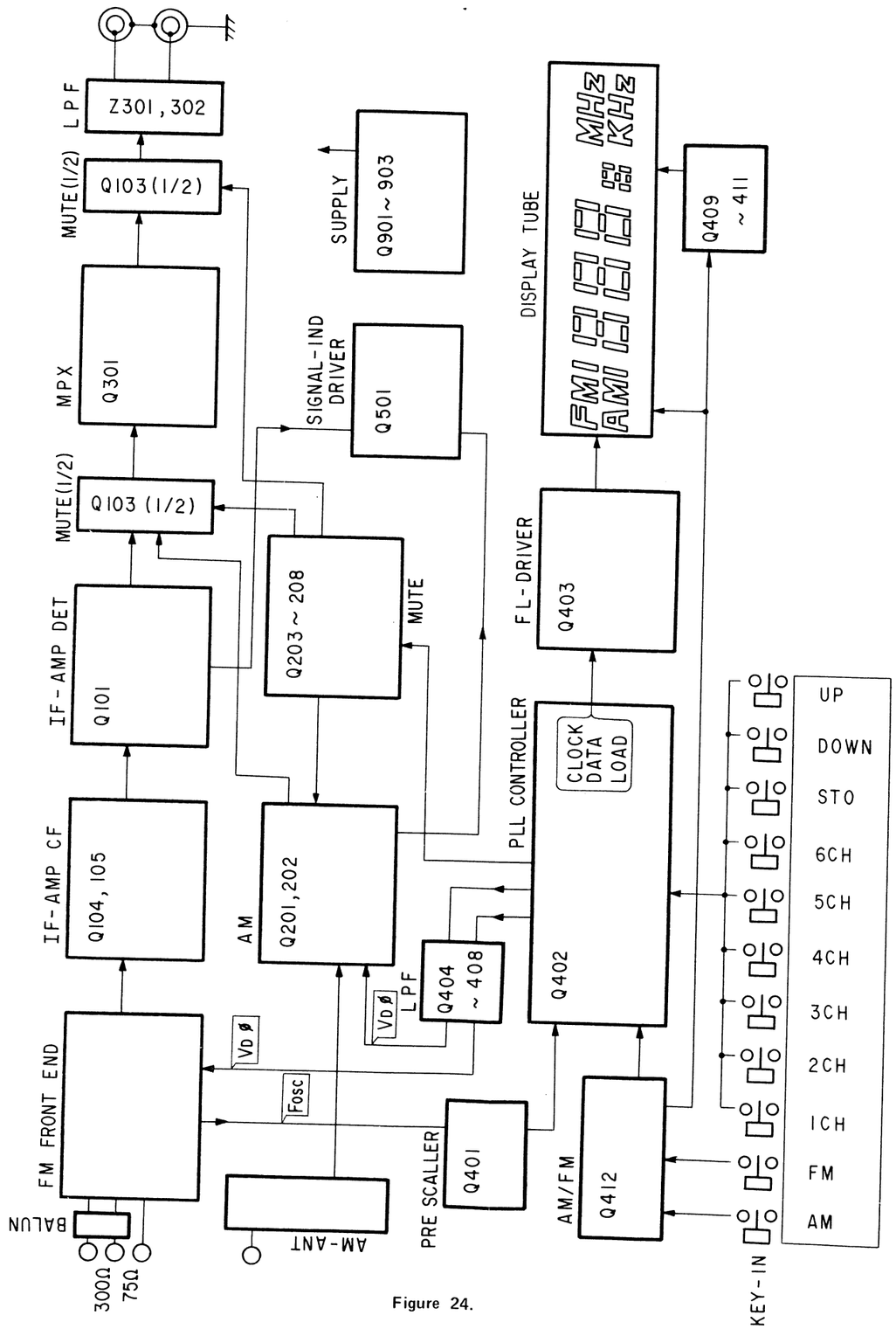


Figure 24.

5. ALIGNMENT INSTRUCTIONS

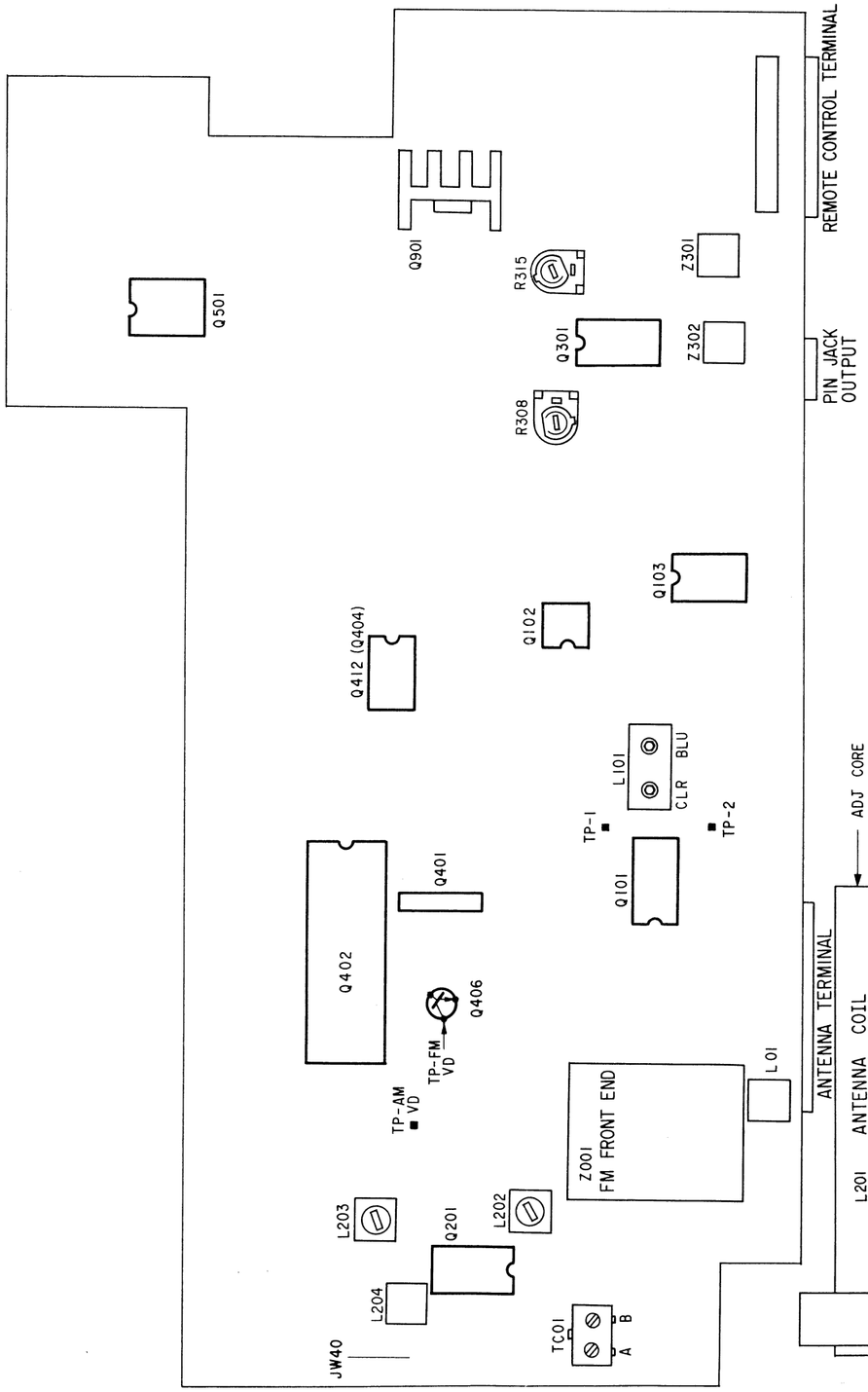


Figure 25.

AM ADJUSTMENT

Test equipments/Tools required

1. Signal generator (with frequency counter)
2. Sweep generator
3. Test loop Antenna
4. Adjusting screwdriver
5. Oscilloscope
6. Dummy load resistor

IF ADJUSTMENT/STOP SIGNAL ADJUSTMENT

Step	Adjustment	Remarks
IF Response	L203	Adjust the scope pattern with specified marker (450 kHz) as illustrated in Fig. 26.

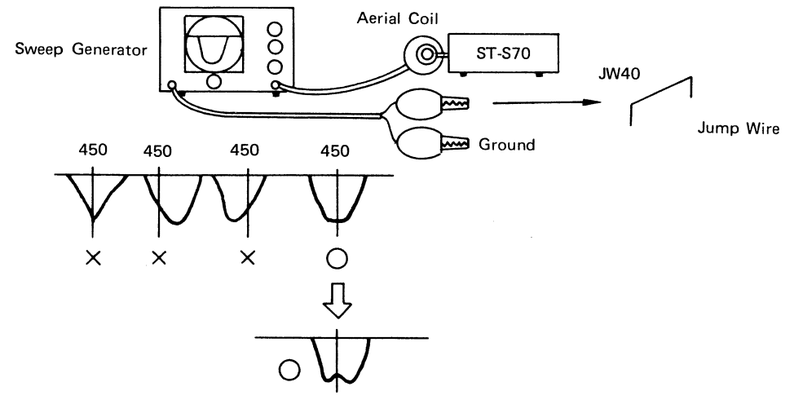


Figure 26.

AM ADJUSTMENT

1. Set function switch to AM.
2. Set signal generator frequency as listed in AM ADJUSTMENT CHART.
3. Proceed as outlined in the TABLE AM ADJUSTMENT CHART.

AM ADJUSTMENT CHART

Step	Signal Generator Connection	Signal Generator Frequency	Display Frequency	Connection	Adjustment	Remarks
VD ϕ	———	———	522 kHz	TP AM VD ϕ	L202	Tester DC 1V
	———	———	1602 kHz	TP AM VD ϕ	TC01-B	Tester DC 20V
1	Test Loop	603 kHz	603 kHz	VTVM across Output	L201	Adjust for Maximum
2	Test Loop	1503 kHz	1503 kHz	VTVM across Output	AM Aer. Trim. TC01-A	Adjust for Maximum
3	Repeat above steps until no futher improvement is noticed.					

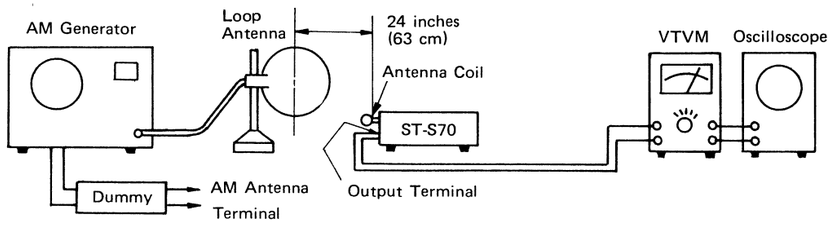


Figure 27.

FM IF ADJUSTMENT

1. Set function switch to FM.
2. Set signal generator frequency as listed in FM IF ADJUSTMENT CHART.
3. Proceed as outlined in the TABLE FM IF ADJUSTMENT CHART.

FM-IF ADJUSTMENT CHART

Step	Signal Generator Connection	Signal Generator Frequency	Display Frequency	VTVM or Oscilloscope Connection	Adjustment	Remarks
1	Connect FM signal generator to FM Antenna Terminal. Connect the modulator to signal generator	98 MHz 60 dB	98 MHz	Connect VTVM to Test Point FM-IF	L101 CLR	Adjust for Test Point FM-IF Voltage 0V
2				VTVM across OUTPUT	L101 BLU	Adjust for Minimum Distortion
3	Repeat steps 1 and 2.					

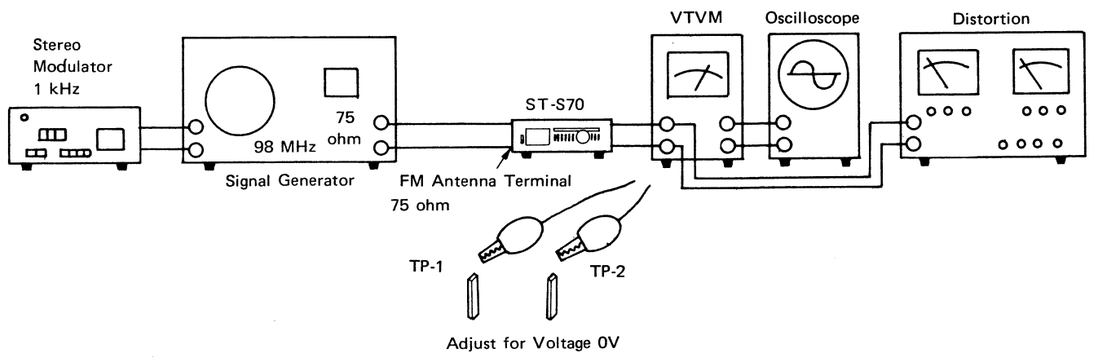


Figure 28.

FM MPX ADJUSTMENT

	Input	VTVM or Oscilloscope Connection	Adjustment	Remarks
Free-runing Frequency Adjustment	Sub Signal of Stereo Modulator	Output	R315	Adjust for Maximum
Separation Adjustment	L-ch of Stereo Modulator	Output (R-ch)	R308	Adjust for Minimum

DISPLAY TUBE

FIP7B8BS

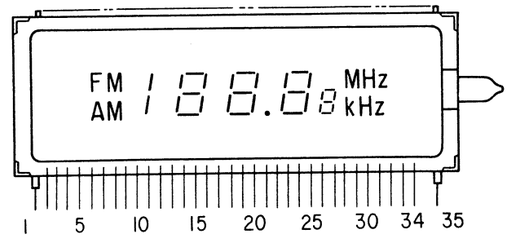


Figure 29.

ELECTRODE CONNECTION

Terminal No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Electrode connected	F	P($^{b5}_{c5}$)	P(a4)	P(f4)	P(e4)	P(d4)	P(c4)	G	P(g4)	P(b4)	P(a3)	P(f3)	P(e3)	P(d3)	P(c3)	P(g3)	P(b3)	P(a2)

Terminal No	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Electrode connected	G	P(f2)	P(e2)	P(d2)	P(c2)	P(g2)	P(b2)	P($^{b1}_{e1}$)	P(g1)	P(kHz)	P(MHz)	P($^{FM}_{DP}$)	P(AM)	P($^{a1d1}_{af1}$)	G	G	F

DISPLAY PATTERN

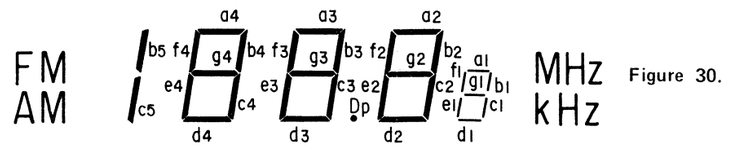
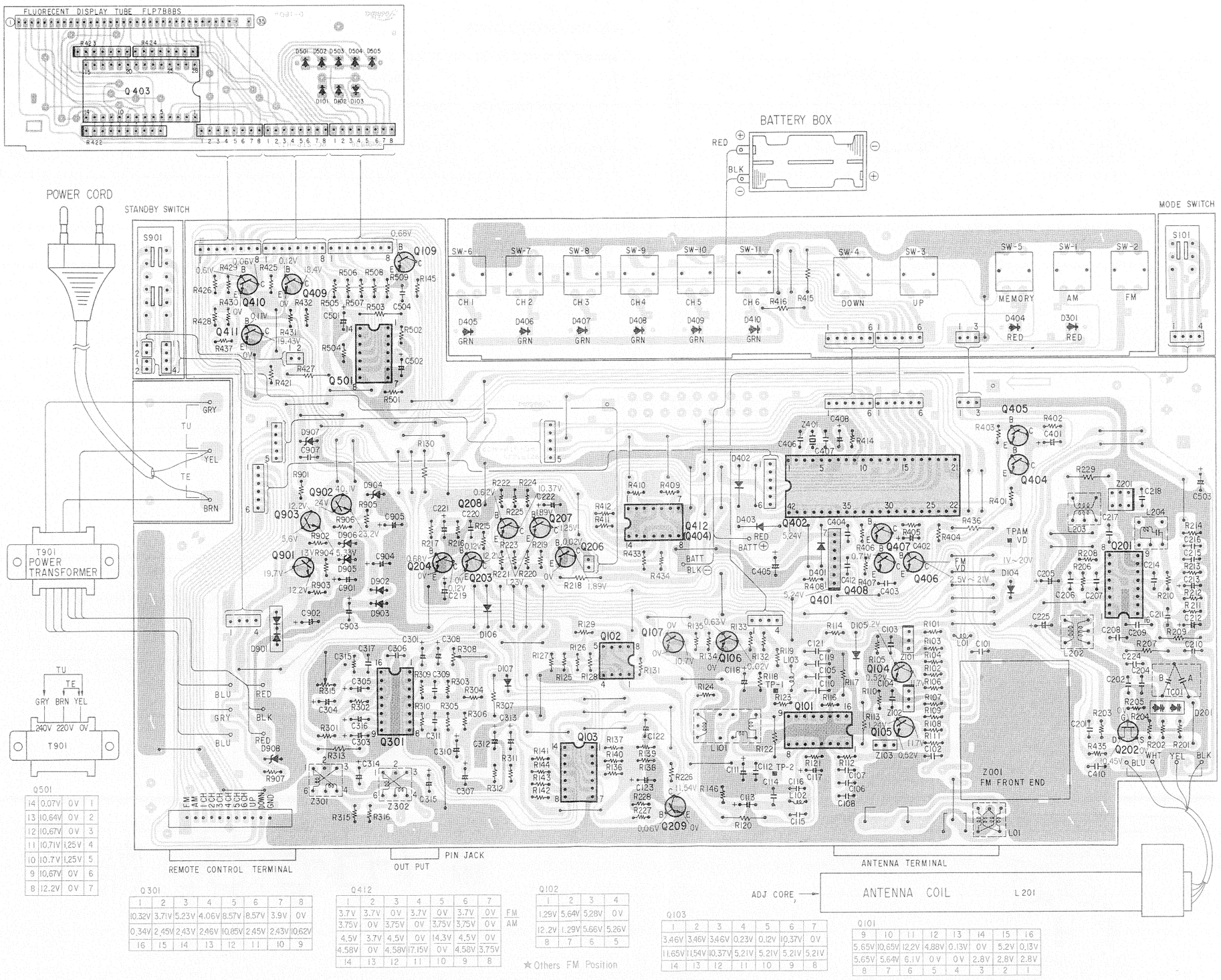


Figure 30.

6. ELECTRICAL PARTS LOCATIONS



Q501

14	0.07V	0V	1
13	10.64V	0V	2
12	10.67V	0V	3
11	10.71V	1.25V	4
10	10.7V	1.25V	5
9	10.67V	0V	6
8	12.2V	0V	7

Q301

1	2	3	4	5	6	7	8	
10.32V	3.71V	5.23V	4.06V	8.57V	8.57V	3.9V	0V	
0.34V	2.45V	2.43V	2.46V	10.85V	2.45V	2.43V	10.62V	
16	15	14	13	12	11	10	9	

Q412

1	2	3	4	5	6	7	
3.7V	3.7V	0V	3.7V	0V	3.7V	0V	FM
3.75V	0V	3.75V	0V	3.75V	3.75V	0V	AM
4.5V	3.7V	4.5V	0V	14.3V	4.5V	0V	
4.58V	0V	4.58V	17.15V	0V	4.58V	3.75V	
14	13	12	11	10	9	8	

Q102

1	2	3	4
1.29V	5.64V	5.28V	0V
12.2V	1.29V	5.66V	5.26V
8	7	6	5

★Others FM Position

Q103

1	2	3	4	5	6	7
3.46V	3.46V	3.46V	0.23V	0.12V	0.37V	0V
11.65V	11.54V	10.37V	5.21V	5.21V	5.21V	5.21V
14	13	12	11	10	9	8

Q101

9	10	11	12	13	14	15	16
5.65V	10.65V	12.2V	4.88V	0.13V	0V	5.2V	0.13V
5.65V	5.64V	6.1V	0V	0V	2.8V	2.8V	2.8V
8	7	6	5	4	3	2	1

Q201 AM Position

8	2.85V	8.66V	9
7	1.3V	0V	10
6	3.64V	12.2V	11
5	11.84V	0.49V	12
4	9.41V	0.69V	13
3	11.3V	1.45V	14
2	2.23V	0V	15
1	5.03V	0.96V	16

Figure 31.

7. SCHEMATIC DIAGRAM

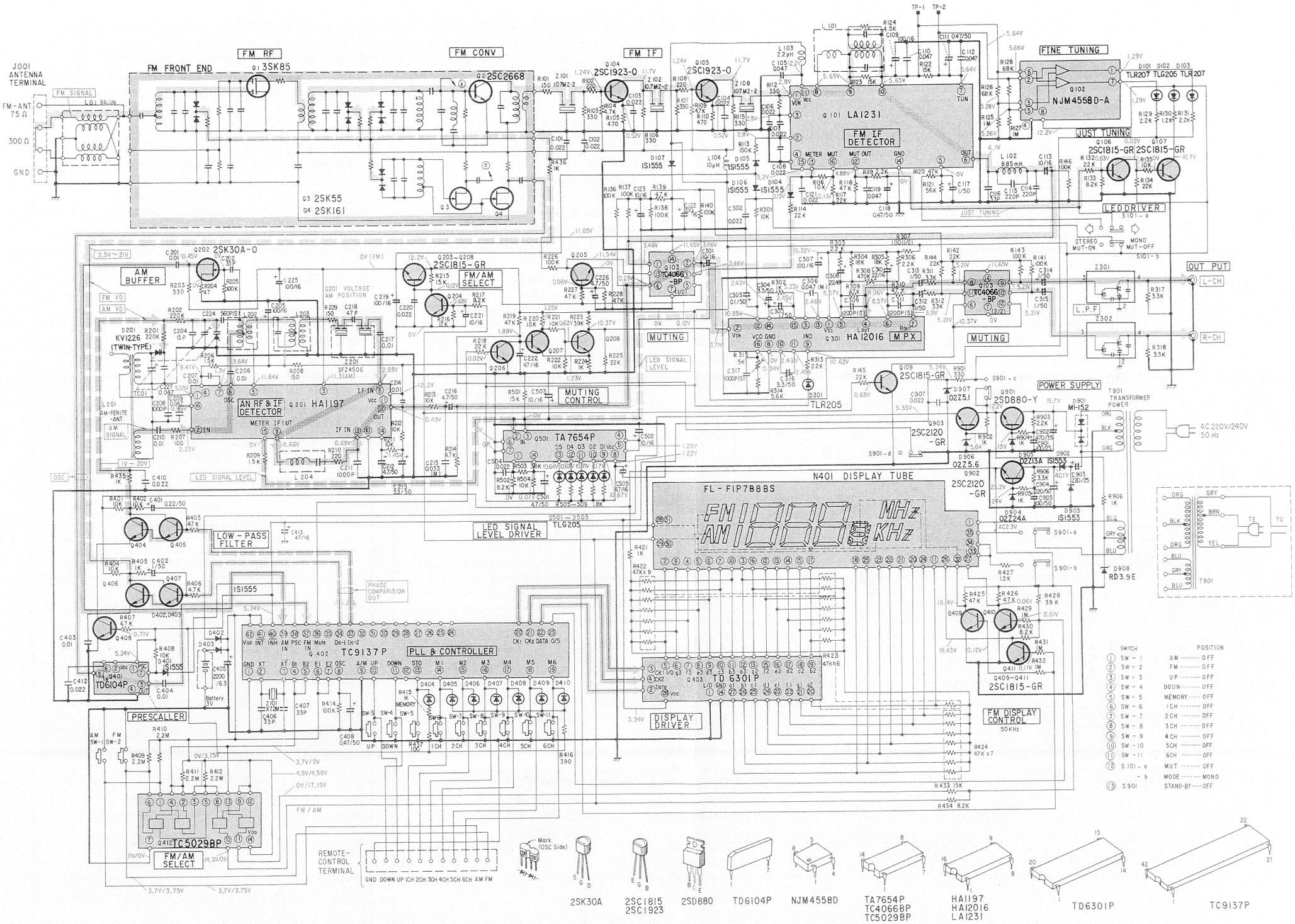
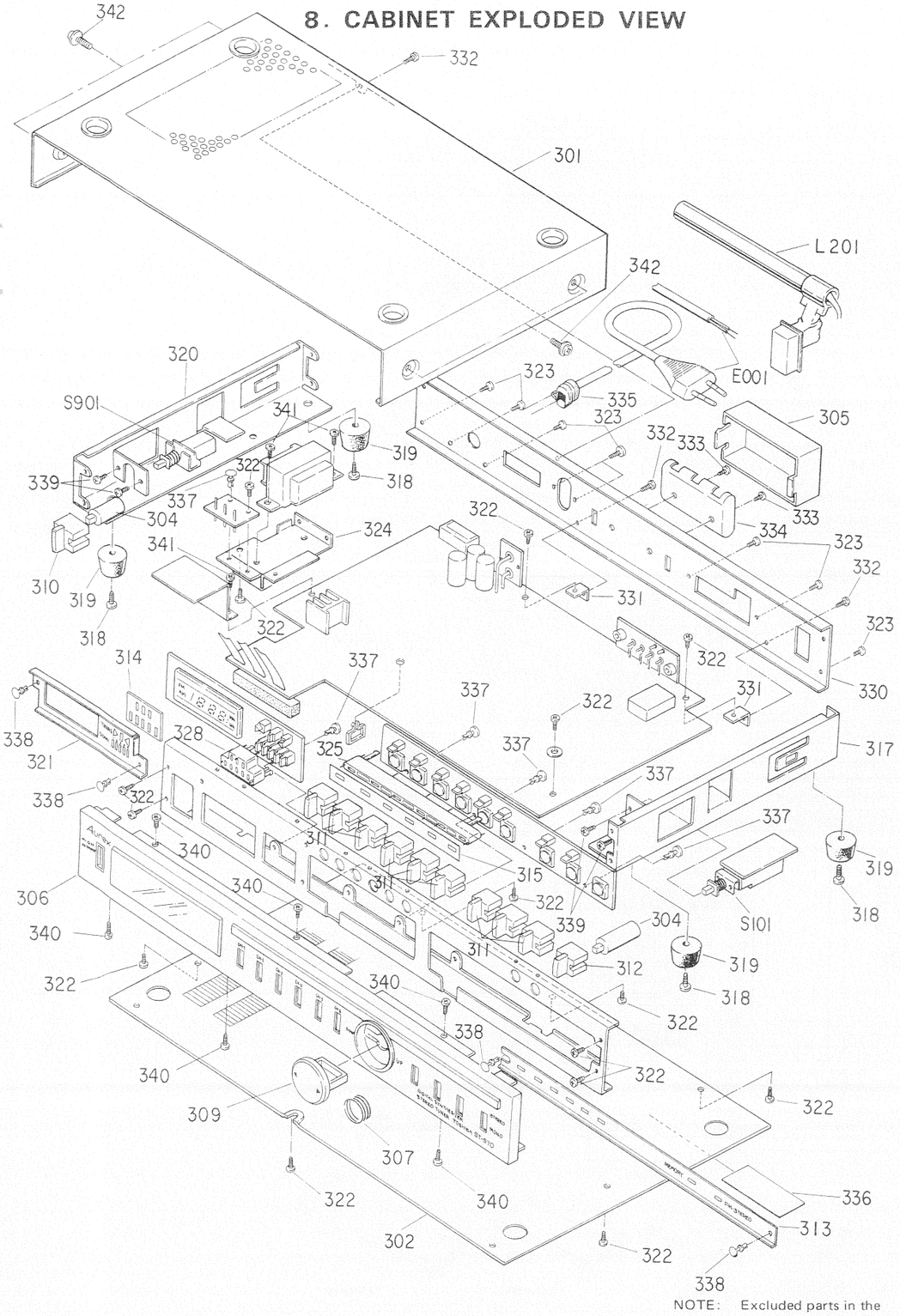


Figure 32.

8. CABINET EXPLODED VIEW



NOTE: Excluded parts in the Parts List are not available as replacement parts.

Figure 33.

9. PARTS LIST

CAUTION: The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part No.	Description
		CABINET PARTS
301	20015220	Cover Ass'y, Top
304	22755389	Joint
305	22832560	Cover, Battery
306	20017157	Panel Ass'y, Front
307	25777020	Spring, Tuning Knob
309	22884048	Knob Ass'y, Tuning
310	22824350	Knob Ass'y, Power
311	22884062	Knob Ass'y, Push
312	22884013	Knob Ass'y, Push
313	20033132	Plate, LED
318	22707130	Screw, 3ø x 10mm, PAN Tapping
319	22828078	Leg
321	20033134	Plate Ass'y, Decoration
322	22707115	Screw, 3ø x 8mm, Tapping
323	22701326	Screw, 3ø x 8mm, Tapping, BLK
330	20015208	Plate, Jack
332	22707066	Screw, 3ø x 6mm, FTBID, BLK
333	22707367	Screw, 2.6ø x 8mm, DTBID
334	22832559	Box, Battery
⚠ 335	25845528	Bush, Power Cord
336	22864386	Label, Name (TE)
	22864387	Label, Name (TU)
to Page 25		
		ICS, TRANSISTORS & DIODES
Q101	22114700	IC, LA1231
Q102	22114470	IC, NJM4558D-A
Q103		IC, TC4066BP
Q104, 105		Transistor, 2SC1923-O
Q106, 107, 109		Transistor, 2SC1815-GR
Q201	22114587	IC, HA1197
Q202		Transistor, 2SK30A-O
Q203, 204, 205, 206, 207, 208		Transistor, 2SC1815-GR
Q301	22114837	IC, HA12016
Q401		IC, TD6104P
Q402		IC, TC9137P
Q403		IC, TD6301P
Q404, 405, 406, 407, 408, 409, 410, 411		Transistor, 2SC1815-GR

Symbol No.	Part No.	Description
Q412		IC, TC5029BP
Q501		IC, TA7654P
Q901		Transistor, 2SD880-Y
Q902, 903,		Transistor, 2SC2120-GR
D101, 103		Diode, TLR207
D102		Diode, TLG205
D104, 105, 106, 107		Diode, 1S1555V
D201	22115599	Diode, KV1226
D301		Diode, TLR205
D401, 402, 403		Diode, 1S1555V
D404		Diode, TLR205
D405, 406, 407, 408, 409, 410		Diode, TLG205
D501, 502, 503, 504, 505		Diode, TLG205
⚠ D901	22115427	Diode, MI-152
D902, 903		Diode, 1S1553V
D904		Diode, 02Z24A
D905		Diode, 02Z13A
D906		Diode, 02Z5.6A
D907		Diode, 05Z5.1A
D908	22115410	Diode, RD3.9E
		COILS & TRANSFORMERS
L01	22290013	Coil, Balun
L101	22267383	IF Transformer, FM
L102	22232219	Coil, 8.85mH
L103	22291082	Coil, 2.2μH
L103	22232237	Coil, 10μH
L201	22242824	Coil, Antenna, AM
L202	22264718	IF Transformer, AM
L203	22264757	IF Transformer, AM
L204	22245365	Coil, AM
⚠ T901	22223873	Transformer, Power (TU)
⚠	22223964	Transformer, Power (TE)
		ELECTRICAL PARTS
SW1	22195219	Switch, Key, AM
SW2		FM
SW3		UP
SW4		DOWN
SW5		MEMORY
SW6 to 11		1 CH to 6 CH
S101	22195294	Switch, Push, MUT/MODE

Symbol No.	Part No.	Description
⚠ S901	22195649	Switch, Push, STAND BY
J001	22162463	Terminal, Antenna
J301	22163821	Jack, US2P
Z001	22131368	FM Front End Unit
Z101, 102, 103	22153126	Filter, Ceramic, 10.7M
Z201	22153125	Filter, Ceramic, 450K
Z301, 302	22212058	Coil
Z401	22153141	Crystal, 7.2MHz
N401	22104548	Display Tube
⚠ E001	22176286	Cord, Power, E2ES (TE)
⚠	22176536	Cord, Power, BS (TU)
CAPACITORS **J = ±5%, K = ±10%, M = ±20%, Z = –20+80%** **ABBREVIATION: CD=Ceramic Disk, EL=Electrolytic MY=Mylar, PP=Polypropylene, BL=Barrier Layer**		
C101	22342223	CD, 0.022mfd, 50V, Z
C102	22342223	CD, 0.022mfd, 50V, Z
C103	22342223	CD, 0.022mfd, 50V, Z
C104	22342223	CD, 0.022mfd, 50V, Z
C105	22342473	CD, 0.047mfd, 50V, Z
C106	22342223	CD, 0.022mfd, 50V, Z
C107	22342223	CD, 0.022mfd, 50V, Z
C108	22342223	CD, 0.022mfd, 50V, Z
C109	22485101	EL, 100mfd, 16V
C110	22342473	CD, 0.047mfd, 50V, Z
C111	22488478	EL, 0.47mfd, 50V
C112	22360331	BL, 0.047mfd, 25V, M
C113	22485100	EL, 10mfd, 16V
C114	22362221	CD, 220pF, 50V, K
C115	22362221	CD, 220pF, 50V, K
C116	22361330	CD, 33pF, 50V, J
C117	22488109	EL, 1mfd, 50V
C118	22488478	EL, 0.47mfd, 50V
C119	22342473	CD, 0.047mfd, 50V, Z
C121	22342223	CD, 0.022mfd, 50V, Z
C122	22485101	EL, 100mfd, 16V
C123	22485100	EL, 10mfd, 16V
C201	22342103	CD, 0.01mfd, 50V, Z
C202	22361330	CD, 33pF, 50V, J
C204	22361150	CD, 15pF, 50V, J
C205	22485101	EL, 100mfd, 16V
C206	22342103	CD, 0.01mfd, 50V, Z
C207	22432103	CD, 0.01mfd, 50V, Z
C208	22349102	CD, 1000pF, 50V, K
C209	22342473	CD, 0.047mfd, 50V, Z
C210	22342103	CD, 0.01mfd, 50V, Z
C211	22349102	CD, 1000pF, 50V, K
C212	22488479	EL, 4.7mfd, 50V
C213	22488339	EL, 3.3mfd, 50V

Symbol No.	Part No.	Description
C214	22342103	CD, 0.01mfd, 50V, Z
C215	22372333	MY, 0.033mfd, 50V, K
C216	22488479	EL, 4.7mfd, 50V
C217	22342103	CD, 0.01mfd, 50V, Z
C218	22362470	CD, 47pF, 50V, K
C219	22485101	EL, 100mfd, 16V
C220	22342223	CD, 0.022mfd, 50V, Z
C221	22485100	EL, 10mfd, 16V
C222	22485470	EL, 47mfd, 16V
C224	22321054	PP, 560pF, 50V, J
C225	22485101	EL, 100mfd, 16V
C226	22488479	EL, 4.7mfd, 50V
C227	22360331	BL, 0.047mfd, 25V, M
C301	22485100	EL, 10mfd, 16V
C302	22342223	CD, 0.022mfd, 50V, Z
C303	22488108	EL, 0.1mfd, 50V
C304	22488339	EL, 3.3mfd, 50V
C305	22488109	EL, 1mfd, 50V
C306	22371473	MY, 0.047mfd, 50V, J
C307	22485101	EL, 100mfd, 16V
C308	22485220	EL, 22mfd, 16V
C309	22321058	PP, 1200pF, 50V, J
C310	22485220	EL, 22mfd, 16V
C311	22321058	PP, 1200pF, 50V, J
C312, 313	22488109	EL, 1mfd, 50V
C314, 315	22488109	EL, 1mfd, 50V
C316	22488330	EL, 33mfd, 50V
C317	22321057	PP, 1000pF, 50V, J
C401	22488228	EL, 0.22mfd, 50V
C402	22488109	EL, 1mfd, 50V
C403	22342103	CD, 0.01mfd, 50V, Z
C404	22342103	CD, 0.01mfd, 50V, Z
C405	22482222	EL, 2200mfd, 6.3V
C406	22361330	CD, 33pF, 50V, J
C407	22361330	CD, 33pF, 50V, J
C408	22488478	EL, 0.47mfd, 50V
C410	22342223	CD, 0.022mfd, 50V, Z
C412	22342223	CD, 0.022mfd, 50V, Z
C501	22488479	EL, 4.7mfd, 50V
C502	22485100	EL, 10mfd, 16V
C503	22485100	EL, 10mfd, 16V
C504	22342223	CD, 0.022mfd, 50V, Z
C505	22485470	EL, 47mfd, 16V
C901	22486101	EL, 100mfd, 25V
⚠ C902	22487471	EL, 470mfd, 35V
⚠ C903	22486221	EL, 220mfd, 25V
C904	22488221	EL, 220mfd, 50V
C905	22488101	EL, 100mfd, 50V
C907	22342223	CD, 0.022mfd, 50V, Z
TC01	22309155	Trimmer

Symbol No.	Part No.	Description
	RESISTORS	
	All resistors are carbon film 1/4W, ±5%, unless otherwise noted. K = 1000, M = 1000000	
R101	22555151	150 ohm
R102	22555221	220 ohm
R103	22555331	330 ohm
R104	22555472	4.7K ohm
R105	22555471	470 ohm
R106	22555331	330 ohm
R107	22555331	330 ohm
R108	22555221	220 ohm
R109	22555472	4.7K ohm
R110	22555471	470 ohm
R111	22555331	330 ohm
R112	22555331	330 ohm
R113	22555154	150K ohm
R114	22555223	22K ohm
R115	22555333	33K ohm
R116	22555103	10K ohm
R117	22555223	22K ohm
R118	22555473	47K ohm
R119	22555222	2.2K ohm
R120	22555473	47K ohm
R121	22555563	56K ohm
R122	22555153	15K ohm
R123	22555153	15K ohm
R124	22555152	1.5K ohm
R125	22555105	1M ohm
R126	22555683	68K ohm
R127	22555105	1M ohm
R128	22555683	68K ohm
R129	22555222	2.2K ohm
R130	22555122	1.2K ohm
R131	22555222	2.2K ohm
R132	22555223	22K ohm
R133	22555822	8.2K ohm
R134	22555223	22K ohm
R135	22555103	10K ohm
R136	22555104	100K ohm
R137	22555104	100K ohm
R138	22555104	100K ohm
R139	22555473	47K ohm
R140	22555104	100K ohm
R141	22555104	100K ohm
R142	22555223	22K ohm
R143	22555104	100K ohm
R144	22555223	22K ohm
R145	22555223	22K ohm
R146	22555104	100K ohm
R201	22555224	220K ohm
R202	22555224	220K ohm
R203	22555331	330 ohm

Symbol No.	Part No.	Description
R204	22555470	47 ohm
R205	22555104	100K ohm
R206	22555152	1.5K ohm
R207	22555101	100 ohm
R208	22555151	150 ohm
R209	22555152	1.5K ohm
R210	22555221	220 ohm
R211	22555103	10K ohm
R212	22555103	10K ohm
R213	22555103	10K ohm
R214	22555472	4.7K ohm
R215	22555153	15K ohm
R216	22555123	12K ohm
R217	22555823	82K ohm
R218	22555223	22K ohm
R219	22555473	47K ohm
R220	22555103	10K ohm
R221	22555103	10K ohm
R222	22555103	10K ohm
R223	22555392	3.9K ohm
R224	22555102	1K ohm
R225	22555223	22K ohm
R226	22555104	100K ohm
R227	22555473	47K ohm
R228	22555151	150 ohm
R229	22555151	150 ohm
R301	22555103	10K ohm
R302	22555102	1K ohm
R303	22555222	2.2K ohm
R304	22555183	18K ohm
R305	22555183	18K ohm
R306	22555222	2.2K ohm
R307	22547101	100 ohm, 1/2W
R308	22658548	500K ohm, Semi-fixed Variable
R309, 310	22555473	47K ohm
R311, 312	22555332	3.3K ohm
R313	22555222	2.2K ohm
R314	22555562	5.6K ohm
R315	22658531	5K ohm, Semi-fixed Variable
R316, 317	22555332	3.3K ohm
R401	22555103	10K ohm
R402	22555103	10K ohm
R403	22555472	4.7K ohm
R404	22555103	10K ohm
R405	22555102	1K ohm
R406	22555472	4.7K ohm
R407	22555472	4.7K ohm
R408	22555103	10K ohm
R409	22555225	2.2M ohm
R410	22555225	2.2M ohm
R411	22555225	2.2M ohm

Symbol No.	Part No.	Description
R412	22555225	2.2M ohm
R414	22555104	100K ohm
R415	22555102	1K ohm
R416	22555391	390 ohm
R421	22555102	1K ohm
R422	22540472	47K ohm x 9, Composite Part
R423	22540473	47K ohm x 6, Composite Part
R424	22540265	47K ohm x 7, Composite Part
R425	22555473	47K ohm
R426	22555473	47K ohm
R427	22555122	1.2K ohm
R428	22555393	39K ohm
R429	22555105	1M ohm
R430	22555822	8.2K ohm
R431	22555105	1M ohm
R432	22555105	1M ohm
R433	22555153	15K ohm
R434	22555822	8.2K ohm
R435	22555102	1K ohm
R436	22555101	100 ohm
R437	22555102	1K ohm
R501	22555153	15K ohm
R502	22555822	8.2K ohm
R503	22555333	33K ohm
R504	22555103	10K ohm
R505	22555182	1.8K ohm
R506	22555182	1.8K ohm
R507	22555182	1.8K ohm
R508	22555182	1.8K ohm
R509	22555182	1.8K ohm
R901	22555331	330 ohm
R902	22555102	1K ohm
R903	22555222	2.2K ohm
R904	22555102	1K ohm
R905	22555102	1K ohm
R906	22555332	3.3K ohm
R907	22555102	1K ohm
ACCESSORIES		
AC01	22902828	Owner's Manual
AC02	22124701	Feeder Ass'y, Antenna
AC03	22164775	Cord, Joint

Symbol No.	Part No.	Description
CABINET PARTS		
337	22705020	Rivet Plastic, 3ø x 4.5mm
338	22705021	Rivet Plastic, 3ø x 3.5mm
339	22707452	Screw, 3ø x 5mm, BID
340	22707490	Screw, 3ø x 6mm, Tapping
341	22701435	Screw, 3ø x 6mm, TPAN
342	22707522	Screw, 3ø x 6mm, FLDT, Chrome